

# Breastfeeding Associated with Lower Rates of Obesity and Lower Risk of Insulin Resistance

**Breast milk feeding**, compared with infant formula feeding, and breastfeeding duration are associated with lower rates of **obesity** and lower risk of **insulin resistance**.

## General Information

<b>Broad Focus Area</b>	Obesity and altered physical development
<b>Background and Justification</b>	<p>Although the relation of breastfeeding to subsequent overweight has been examined numerous times,<sup>1</sup> only the results of two large, recent studies have provided evidence that there may be a protective effect.<sup>2,3</sup> Data remain sparse on whether the protective association with overweight persists later in adolescence.<sup>2</sup> Questions remain whether the protective effect, if any, is due to constituents of breast milk, or due to differences in feeding practices for breast and formula-fed infants. Furthermore, existing studies rely on retrospectively-reported breastfeeding histories. If breastfeeding does help prevent subsequent obesity, this would be one of the few protective preventive measures available.<sup>4</sup> The relationship of large racial and ethnic differences in infant feeding practices (e.g., approximately 34% of white infants are breastfed at 6 months of age, compared to 21% of black children and 28% of Hispanic children)<sup>5</sup> to subsequent differences in childhood obesity<sup>6</sup> may also be explored. Identifying whether the protective effect is due to constituents of breast milk or to differences in feeding practices would help inform recommendations regarding mode of breast milk feeding in infants.</p>
<b>Prevalence/ Incidence</b>	<p>In 2000, almost 70% of all infants were breastfed (either exclusively or in combination with formula feeding) before initial hospital discharge. However, by 6 months of age, just under one-third of infants were breastfed.<sup>5</sup></p> <p>The prevalence of overweight among children is greater than 16% among children aged 6 years or more, and this prevalence has increased over the past 40 years.<sup>6,7</sup> Being overweight as a child is a risk factor for being overweight in adulthood,<sup>8</sup> and is associated with increased risk of type 2 diabetes, hypertension, and coronary artery disease.<sup>9</sup> Furthermore, being overweight as a child increases the risk of developing type 2 diabetes before the age of 21 years.<sup>10</sup></p>
<b>Economic Impact</b>	Because child overweight is a risk factor for adult overweight, child overweight contributes to the more than \$40 billion annual cost of obesity in the U.S. <sup>11</sup>

Exposure Measures		Outcome Measures	
<b>Primary/ Maternal</b>	Breast milk feeding and duration	<b>Primary/ Maternal</b>	
Methods	Interview	Methods	
Life Stage	Birth & and periodically in the first year of life	Life Stage	
<b>Primary/Child</b>	Components of breast milk	<b>Primary/Child</b>	<u>Insulin resistance:</u> - Serum insulin levels, Glucose levels, HgbA1C <u>Obesity:</u> - IGF

				- Body size and habitus - Body composition
Methods	Breast milk sample		Methods	Blood sample, Physical exam
Life Stage	Birth & 1-2 months		Life Stage	Birth & Years 1, 2, 5, 10, 15, 20

Important Confounders/Covariates	
Lipid profile	Increased lipid levels are associated with an increased risk of insulin resistance <sup>12</sup>
Glucokinase mutation	Glucokinase mutation is associated with increased risk of maturity onset diabetes of the young (MODY) <sup>13</sup>
Hormone levels such as cortisol, growth hormone, insulin-like growth factors	Elevated levels of these and other hormones are associated with obesity and insulin resistance in children <sup>14</sup>
Genetic markers for obesity	Certain genetic markers increase risk of obesity
Parents' body mass indices	BMI and obesity are associated with certain genetic markers. <sup>15</sup>
Family history of diabetes and obesity	A family history of diabetes and obesity increases child's risk. <sup>16, 15</sup>
Lifestyle factors	Less active lifestyles would increase risk of obesity and insulin resistance. <sup>10</sup>
Nutrition	Poor nutritional and high caloric diet would increase risk of obesity and insulin resistance <sup>17</sup>
Socio-economic status and demographics	Children of lower economic status, ethnic and racial groups (particularly Native Americans, Hispanics, African Americans, and Asians) are at higher risk of obesity and insulin resistance. <sup>16</sup>

Population of Interest	Estimated Effect that is Detectable
All pregnant women and their offspring.	Assuming a breastfeeding prevalence of 50% (in line with estimates from NHANES III), <sup>18</sup> and using the power assumptions noted above, the smallest detectable relative risk for obesity would be 1.05; and for metabolic syndrome would be 1.3.

Other Design Issues	
Ethical/Burden Considerations	Blood studies, especially fasting, in younger children will require careful attention. Obtaining consent for the use of DNA may be an issue.
Cost/Complexity of Data Collection	Addressing this hypothesis based on obesity and insulin resistance measures at later life-stages may be adversely impacted by attrition of study subjects.

### References:

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